

The so-called *muscles* of the Scyphistomes originate neither from the endoderm nor from the outer wall of the cup, but from funnel-shaped invaginations of the perioral ectoderm into the interior of the septa and folds, into which they extend themselves like tubes and remain hollow. The *orifices* of these tubes are still present on the young strobila, so that the *first Ephyra* appears as the original oral segment of the Scyphistoma.

Besides the strobila-formation a regular budding of the Scyphistoma occurs; in *Cotylorhiza* I frequently saw the bud grow forth with the foot foremost, so that its last connexion with the parent animal was at the mouth.

From these observations, made throughout on intact living objects and upon the finest sections, the following deductions may be drawn:—

a. The *cœlogastrula* of the Scyphomedusæ investigated is a *secondary embryonic form*, as the gastrulation is effected by the *immigration of the endoderm into the cavity of the cœloblastula*.

b. The *Scyphistoma* is a *perfect Anthozoon*. In favour of the close relationship of these two forms only the gastral folds could hitherto be cited; but these also occur, although imperfectly, in Hydroids, and therefore were not thoroughly decisive as to this relationship. The *invagination of the ectodermal cœsophagus observed by me and the gastral sacs and septa surrounding it*, however, stamp the Scyphistoma as a true Anthozoon.

c. As the strobila is produced only by simple division, and the Ephyra originates under certain circumstances, even without division, directly from the Scyphistoma, every ground for the assumption of an alternation of generations in *Aurelia* and *Cotylorhiza* is removed. *The Ephyra, and consequently the Scyphomedusa, is a metamorphosed Scyphistoma or Anthozoon, just as the Hydroid Medusa is a metamorphosed Hydroid Polyp.*—*Zoologischer Anzeiger*, no. 205, Oct. 5, 1885, p. 554.

On the Original Fundamental Numbers of Medusæ and Echinoderms.
By WILHELM HAACKE.

Häckel founds his genealogical tree of the Echinodermata, in which he adopts the Asterida as the ancestors of the other Echinodermata, upon the circumstance that in the Asterida there are species with a variable number of arms and others with a constantly augmented number, while the same thing does not occur in the other Echinodermata, those “worshippers of the number five,” with the exception of the Ophiuræ, which, according to Häckel, are nearly related to the Stellerida.

I have now to state that I have found four quaternary examples and one sextenary one in a South-Australian species of the Echinid genus *Amblyneustes*. Whether similar specimens have been

observed in other species of Echinida or among the Holothuriæ, Crinoidea, and Blastoidea I do not know; our textbooks and manuals give no information upon such questions. But, at any rate, my specimens prove that the privilege of a variable number of parameres is not enjoyed by the Asterida alone.

What conclusions are to be drawn from my discovery with regard to the genealogical tree of the Echinodermata, is a question which I only wish to raise here; but my communication of it gives me the opportunity of calling attention to the insecure foundation of the above inference of Hæckel's.

With regard to the Medusæ we are indebted to Hæckel for the demonstration of the original fundamental number of four, from which the other fundamental numbers which occur among the Medusæ are to be derived; and the question therefore presses itself upon us whether the fundamental number five, which prevails among the Echinodermata, is not also the original number.

In my memoir upon *Hydra* ('Jenaische Zeitschrift,' 1880) I have endeavoured to give an explanation of the original tetramerism of the Medusæ, which I may here confirm by an observation made some years ago at Kiel. I must refer to the above-mentioned memoir, the most essential results of which have also been obtained by other naturalists, and have here only to indicate that the Medusa-bud of *Sarsia tubulosa* is so placed with regard to the parent polyp of *Syncoryne Sarsii* that one of the median planes of the young Medusa fixed by the tentacles of the bud stands perpendicular to the principal axis of the parent polyp, while the latter coincides with the other median plane of the bud.

The fundamental number of the quaternary Medusæ, at least of the Craspedota, is therefore causally conditioned by the lateral budding of the Medusa on the polyp; and it is therefore a question whether something analogous cannot be demonstrated in the case of the Echinodermata also, although in them there can of course be no question of lateral budding.

In any case the question whether pentamerism is or is not something primordial in the Echinodermata is still an open one; with reference to the undoubtedly original tetramerism of the Medusæ one might feel inclined to answer it affirmatively.—*Zoologischer Anzeiger*, no. 203, August 31, 1885, p. 505.